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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/577,309	01/19/2007	Tatsuo Esaki	1272-0124PUS1	5180
2292 7590 05/15/2008 BIRCH STEWART KOLASCH & BIRCH PO BOX 747 FALLS CHURCH, VA 22040-0747				
EXAMINER LANGMAN, JONATHAN C				
ART UNIT		PAPER NUMBER		
1794				
NOTIFICATION DATE		DELIVERY MODE		
05/15/2008		ELECTRONIC		

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

mailroom@bskb.com

Office Action Summary

Application No.

10/577,309

Applicant(s)

ESAKI ET AL.

Examiner

JONATHAN C. LANGMAN

Art Unit

1794

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 24 July 2007.
2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-4 is/are pending in the application.
4a) Of the above claim(s) 3 and 4 is/are withdrawn from consideration.
5) ☐ Claim(s) _____ is/are allowed.
6) ☒ Claim(s) 1 and 2 is/are rejected.
7) ☐ Claim(s) _____ is/are objected to.
8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
10) ☒ The drawing(s) filed on 28 April 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-850)
Paper No(s)/Mail Date 4/28/2006 and 7/24/2007
4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____

DETAILED ACTION

Election/Restrictions

Restriction is required under 35 U.S.C. 121 and 372.

This application contains the following inventions or groups of inventions which are not so linked as to form a single general inventive concept under PCT Rule 13.1.

In accordance with 37 CFR 1.499, applicant is required, in reply to this action, to elect a single invention to which the claims must be restricted.

Group 1, claim(s) 1 and 2, drawn to an article.

Group 2, claim(s) 3 and 4, drawn to a method of making an article.

The inventions listed as Groups I and II do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons:

(1) The special technical feature for each group is not commonly shared.

In particular, the special technical feature of Group I is a joined aluminum nitride body with specific material properties. The special technical features of Group II include joined aluminum nitride bodies with recessed portions, particle size of molybdenum and tungsten, paste, adhesive layer, dewaxing, and sintering at two cycles. None of these technical features are shared in group I. Therefore, the inventions or groups of inventions lack unity.

During a telephone conversation with Marc Weiner on April 24, 2005 a provisional election was made with traverse to prosecute the invention of Group I,

claims 1 and 2. Affirmation of this election must be made by applicant in replying to this Office action. Claims 3 and 4 withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

The examiner has required restriction between product and process claims. Where applicant elects claims directed to the product, and the product claims are subsequently found allowable, withdrawn process claims that depend from or otherwise require all the limitations of the allowable product claim will be considered for rejoinder. All claims directed to a nonelected process invention must require all the limitations of an allowable product claim for that process invention to be rejoined.

In the event of rejoinder, the requirement for restriction between the product claims and the rejoined process claims will be withdrawn, and the rejoined process claims will be fully examined for patentability in accordance with 37 CFR 1.104. Thus, to be allowable, the rejoined claims must meet all criteria for patentability including the requirements of 35 U.S.C. 101, 102, 103 and 112. Until all claims to the elected product are found allowable, an otherwise proper restriction requirement between product claims and process claims may be maintained. Withdrawn process claims that are not commensurate in scope with an allowable product claim will not be rejoined. See MPEP

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§ 821.04(b). Additionally, in order to retain the right to rejoinder in accordance with the above policy, applicant is advised that the process claims should be amended during prosecution to require the limitations of the product claims. **Failure to do so may result in a loss of the right to rejoinder.** Further, note that the prohibition against double patenting rejections of 35 U.S.C. 121 does not apply where the restriction requirement is withdrawn by the examiner before the patent issues. See MPEP § 804.01.

Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1 and 2 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yushio et al. (US 6,423,400) in view of Yamakawa et al. (US 5,370,907) and Ito et al. (PCT/JP02/08223) (English translation is US publication 2004/0071945).

Yushio et al. teach a susceptor for semiconductor manufacturing equipment obtained by joining plural aluminum nitride layers, 11, with a high melting point metallic layer, 12, and an adhesive layer, 13 (abstract, and col. 6, lines 1-45). The metallic layer preferably has a thickness of 1-100 microns and preferably made of tungsten or molybdenum (col. 8, lines 18-35), or in a specific example has a thickness of 30 microns (col. 22, lines 35-40). After sintering the article, material properties were tested. These material properties included shear strength and warp. The warp was measured to be

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less than 1 micron/1mm (100 microns/100 mm) (see at least col. 23, lines 34-68). The bonding strength, (peeling strength) also known as the shear strength between the metallic layer and the ceramic substrate, which is the same context that the applicant uses, is measured and results are provided in Table 8. Yushio teach a shear strength of up to 3.3 kg/mm^2 and fails to teach a bond strength of greater than 4 kg/mm^2 .

Yamakawa et al. teach a high melting temperature metal consisting of tungsten and molybdenum on an aluminum nitride ceramic body, and a method of improving the peel strength (shear strength) (see at least abstract and col. 1, lines 25-65). By mixing tungsten and molybdenum in certain ratios, shear strengths of greater than 5 kg/mm^2 are obtainable (col.3, lines 60-63) It would have been obvious to a person having ordinary skill in the art at the time the present invention was made to use these mixtures in Yushio's metal layer comprising molybdenum and tungsten on aluminum nitride ceramic because Yamakawa et al. teaches a higher bonding strength and therefore a better product with longer life ability due to the resistance to shear apart is obtainable. Yamakawa and Yushio et al. are both silent to the sheet resistivity of the metal layer. However the applicant's teach in the instant specification that the sheet resistivity is a function of material and layer thickness (pg. 10, lines 16-30). It is noted that Yushio teaches the same materials and the same overlapping layer thickness ranges. The applicants further teach that the sheet resistivity can be reduced by decreasing the particle size of the tungsten and molybdenum materials forming the paste. These particle sizes are taught by the applicant's to be preferably 1-3 microns (page 14, lines 11-27). Ito teaches that when printing pastes of metal material, specifically,

molybdenum and tungsten particles, the average particle size is preferably 0.1-5 microns, in order to ease in the deposition of the conductor containing paste (Ito et al., [0126]-[0128]). Therefore it would have been obvious to a person having ordinary skill in the art at the time the present invention was made to use Mo and W particles ranging between 0.1 and 5 microns in size for the deposition of a conductor paste on ceramic substrates because these particle size ranges are taught by Ito et al. to result in easier deposition. Furthermore it is noted that both Yushio and Yamakawa teach screen printing the conductor paste onto the ceramic substrate (col. 6, lines 55) and (col. 8, lines 48-54), respectively. The metal paste of Yushio et al. utilizing these obvious particle sizes will inherently possess the instantly claimed sheet resistivity, since, Yushio et al. teach the same materials and the same thicknesses, and Ito teaches the obvious particle size distribution. It has been held that where the claimed and prior art products are identical or substantially identical in structure or are produced by identical or a substantially identical processes, a prima facie case of either anticipation or obviousness will be considered to have been established over functional limitations that stem from the claimed structure. *In re Best*, 195 USPQ 430, 433 (CCPA 1977), *In re Spada*, 15 USPQ2d 1655, 1658 (Fed. Cir. 1990). The **prima facie** case can be rebutted by evidence showing that the prior art products do not necessarily possess the characteristics of the claimed products. *In re Best*, 195 USPQ 430, 433 (CCPA 1977).

The applicants teach that by using smaller particle sizes for the conductor material will result in lower sheet resistance but may result in high warp values. These warp values are taught by the applicant in the instant specification to be suppressed by

the addition of an adhesive layer (instant specification, pg 16 lines 25-31). In light of the instant specification, since Yushio et al. teaches the same structure of providing an adhesive layer, 13, on top of the metal conductive layer, 12, it is assumed, expected, and inherent that the structure of Yushio will result in the same warp values as instantly claimed.

Regarding claim 2, Yushio et al. do not specifically teach a conductor paste of 50-90% however, as seen in Figure 3, the conductor paste covers a surface of the ceramic substrate in a portion falling within the instantly claimed ranges of 50-90%. As seen in the figure the conductive layer covers more than half of the ceramic substrate, and does not cover the entire substrate so less than 100%. Therefore it is said that the surface area of metal layer falls within the applicants claimed surface area.

Furthermore, Ito et al. teach similar configurations of the metallic layer on the surface of the ceramic substrate as seen in Figures 6-8. Ito go on to teach that the area where no conductor is formed above the bonding interface is preferably 5% or more ([0021]-[0022]), which allows for sufficient bonding strength. A surface area of 5% no conductor will have 95% conductor. Since Ito teaches 5% or more no conductor, this range goes all the way up to 100% no conductor, which correlates to 0% conductor. Thus Ito et al. teach 0-95% conductor surface area on the bonding interface of the substrate. It would have been obvious to a person having ordinary skill in the art at the time the present invention was made to use this conductor surface area including that presently claimed on the bonding interface of the ceramic substrate of Yushio et al., in order to provide maximum effective bonding strength.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JONATHAN C. LANGMAN whose telephone number is (571)272-4811. The examiner can normally be reached on Mon-Thurs 6:30 am - 4:00 pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Callie Shosho can be reached on 571-272-1123. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

JCL

/Callie E. Shosho/
Supervisory Patent Examiner, Art Unit 1794